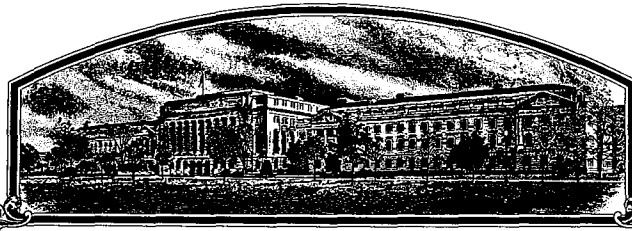


No.



9600204

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'PH24E'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this thirtieth day of July in the year of our Lord one thousand nine hundred and ninety-nine.

Attest:

Ann Marie L...

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Samuel H. Hildner
Secretary of Agriculture



U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER	3. VARIETY NAME
Pioneer Hi-Bred International, Inc.			PH24E
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)	FOR OFFICIAL USE ONLY PVPO NUMBER 9600204 FILING AND EXAMINATION FEE: 2450.00 CERTIFICATION FEE: 300.00 DATE: May 5, 1996 DATE: May 25, 1999
Research and Product Development P.O. Box 85 Johnston, IA 50131-0085		515/270-3300	
6. FAX (include area code)			
515/253-2125			
7. GENUS AND SPECIES NAME	8. FAMILY NAME (Botanical)		
Zea Mays	Gramineae		
9. CROP KIND NAME (Common name)			
Corn			
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name)			
Corporation			
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION	
Iowa		May 6, 1926	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS			14. TELEPHONE (include area code)
2/17/98 Alan R. Grunst Mr. Steven R. Anderson Research and Product Development P.O. Box 85 Johnston, IA 50131-0085			515/270-3328
			15. FAX (include area code)
			515/253-2125
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)			
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)?			
<input type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input checked="" type="checkbox"/> NO (If "no," go to item 20)			
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?		19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?	
<input type="checkbox"/> YES <input type="checkbox"/> NO		<input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED	
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?			
<input type="checkbox"/> YES (If "yes," give names of countries and dates) <input checked="" type="checkbox"/> NO			
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.			
The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believes that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.			
Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.			
SIGNATURE OF APPLICANT (Owner(s))		SIGNATURE OF APPLICANT (Owner(s))	
		Alan R. Grunst	
NAME (Please print or type)		NAME (Please print or type)	
Pioneer Hi-Bred International, Inc.		Alan R. Grunst	
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
		Breeding and Sales Application Coordinator	FEB 29 1996

14A. Exhibit A. Origin and Breeding History

Pedigree: PHP02/PHN82)XA04122213X

Pioneer Line PH24E, Zea mays L., a yellow corn inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross PHP02 X PHN82 using the pedigree method of breeding. The progenitors of PH24E are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for 7 generations in the development of PH24E at Huron, SD. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Huron, SD, as well as other Pioneer research stations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PH24E has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 5 generations with careful attention paid to uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

No variant traits have been observed or are expected in PH24E.

The criteria used in the selection of PH24E were yield, both per se and in hybrid combinations; kernel size, especially important in production; ability to germinate in adverse conditions; number of tillers, especially important in production because having numerous tillers increases hybrid production costs spent on detasseling; disease and insect resistance; pollen yield; tassel size and pollen shed duration.

DEVELOPMENTAL HISTORY FOR PH24E

<u>Season/Year</u>	<u>Inbreeding Level</u>
Summer 1986	F0
Winter 1986	F1
Summer 1987	F2
Summer 1989	F3
Summer 1990	F4
Winter 1990	F5
Summer 1991	F6
Summer 1992	F7*
Winter 1992	F8
Summer 1993	F9
Winter 1993	F10
Summer 1994	F11
Summer 1995	F12*

*PH24E was selfed and selected through F7 generation.

**PH24E was selfed and ear-rowed from F8 through F12 generation.

Exhibit B. Novelty Statement

PH24E is similar to the Pioneer Hi-Bred International, Inc. Proprietary inbred line PHJ90 (PVP Certificate No. 9100093). PH24E sheds pollen and silks approximately 44(1389 versus 1345) and 42(1423 versus 1382) growing degree units later than PHJ90.

PH24E is higher yielding than PHJ90.

PHJ90 is lower harvest moisture than PH24E.

PH24E has better staygreen than PHJ90.

PH24E has higher seedling vigor than PHJ90. (see Table 2)

PH24E has dark green leaf color (Munsell code = 5GY3/4) while PHJ90 has medium green leaf color (Munsell code = 5GY3/6).

PH24E has yellow anther color (Munsell code = 10Y8/8) while

PHJ90 has red anther color (Munsell code = 2.5R4/8).

PH24E has red silk color (Munsell code = 10RP4/6) while

PHJ90 has pink silk color (Munsell code = 7.5R7/6).

Side by side comparisons including data from 1994 only. (see Table 1)

	KWT/ 100K	Leaf Length
PH24E	33.0	83.0
PHJ90	25.5	80.5
# Locs	2	2
Diff	7.5	2.5
t - value	15.000	5.000
PR > T	.004	.0381

PH24E is highly significant greater for KWT/100K than PHJ90.

PH24E is significantly higher for leaf length than PHJ90.

Exhibit B Novelty Statement Tables

Table 1A Data from Johnston, IA in 1994 and 1997 are supporting evidence for differences between PH24E and PHJ90. Locations had different environmental conditions. One location was irrigated and 1 was not, locations had different planting dates and were in different fields.

year	Trait	variety-1	variety-2	Count-1	Count-2	Mean-1	Mean-2	Mean_Diff	DF_Pooled	t-Value_Pooled	Prob_(2-tail)_Pooled
1994	kernel weight per 100k	PHJ90	PH24E	2	2	25.5	33.0	-7.5	2	-15.00	0.004
1997	kernel weight per 100k	PHJ90	PH24E	2	2	25.0	28.5	-3.5	2	-3.13	0.089

Exhibit B

Table 1B Summary data from Johnston, IA across 1994 and 1997 are supporting evidence for differences between PH24E and PHJ90. Locations had different environmental conditions. One location was irrigated and 1 was not, locations had different planting dates and were in different fields.

Trait	variety-1	variety-2	Count-1	Count-2	Mean-1	Mean-2	Mean_Diff	DF_Pooled	t-Value_Pooled	Prob_(2-tail)_Pooled
kernel weight per 100k	PHJ90	PH24E	4	4	25.3	30.8	-5.5	6	-3.93	0.008

9600204

Exhibit B

Table 2. Data are from paired comparisons in the adapted growing area of PH24E. Table shows stable, consistent, significant differences between PH24E and PHJ90 for yield, harvest moisture (MST), seedling vigor (SDGVGR), late season plant health or stay green (STAGRN), and kernels per KG (KERKG).

	Var 1 = PH24E	Var 2 = PHJ90	BU	ACR	BU	GQU	GQU	MST	SDG	GDU	GDU	STA	KER	KER
YEAR			ACR	%MN	ABS	/HA	%MN	ABS	VGR	SHD	SLK	GRN	/KG	LB
93			77.7	158	48.7	158	158	18.2	3.6	138.1	140.5	5.8	3497.8	1588
			51.6	103	32.4	103	103	15.9	5.5	134.3	136.9	2	5434.9	2467
LOCS			8	8	8	8	8	11	7	15	15	7	7	7
REPS			16	16	16	16	16	19	11	16	16	12	7	7
T-test	PROB		.001#	.002#	.001#	.002#	.002#	.006#	.003#	.000#	.000#	.000#	.000#	.000#
94			2.1	125	64.1	125	125	19.9	3.5	139.5	143.2	5.1	3018.1	1370
			90.2	113	56.6	113	113	18.2	4.9	135.6	139.7	2.4	4317.9	1960
LOCS			12	12	12	12	12	13	21	38	37	12	2	2
REPS			21	21	21	21	21	23	28	40	39	19	2	2
T-test	PROB		.018+	.059*	.018+	.059*	.059*	.003#	.000#	.000#	.000#	.000#	0.375	0.375
95			72.7	99	45.6	99	99	16.1	3.9	137.3	141.8	3.7	3208	1456
			71.4	93	44.8	93	93	16.6	5.2	132.7	135.7	2.4	3504	1591
LOCS			11	11	11	11	11	11	18	40	40	9	1	1
REPS			16	16	16	16	16	17	21	45	45	11	1	1
T-test	PROB		0.852	0.628	0.852	0.628	0.628	0.505	.002#	.000#	.000#	0.111		
96			75.8	122	47.6	122	122	23.3	3.4	139.5	142.4	5.7	3298.9	1498
			64	102	40.1	102	102	21.1	4.6	134.5	139	2.8	4550.8	2066
LOCS			17	17	17	17	17	19	22	47	47	6	3	3
REPS			24	24	24	24	24	26	26	48	48	6	3	3
T-test	PROB		.001#	.002#	.001#	.002#	.002#	.001#	.000#	.000#	.000#	.005#	.023+	.023+
97			92.6	132	58.1	132	132	22.4	4.4	138.7	141.4	5.4	3585.9	1628
			77.8	111	48.8	111	111	20.8	5.1	134.6	138.5	3	4622.6	2099
LOCS			28	28	28	28	28	29	22	43	40	10	3	3
REPS			32	32	32	32	32	33	23	43	40	11	3	3
T-test	PROB		.000#	.001#	.000#	.001#	.001#	.001#	.010+	.000#	.000#	.000#	.034+	.034+
TOTAL SUM			85.9	127	53.9	127	127	20.8	3.8	138.7	142.1	5.1	3398.9	1543
			73	106	45.8	106	106	19.3	5	134.4	138.1	2.5	4856.5	2205
LOCS			76	76	76	76	76	83	90	183	179	44	16	16
REPS			109	109	109	109	109	118	109	192	188	59	16	16
DIFF			12.9	21	8.1	21	21	1.6	1.2	4.4	4	2.6	1457.6	662
T-Test	PROB		.000#	.000#	.000#	.000#	.000#	.000#	.000#	.000#	.000#	.000#	.000#	.000#

United States Department of Agriculture, Agricultural Marketing Service
Science Division, Plant Variety Protection Office
National Agricultural Library Building, Room 500
Beltsville, MD 20705

OBJECTIVE DESCRIPTION OF VARIETY
CORN (*Zea mays* L.)

Name of Applicant(s) Pioneer Hi-Bred International, Inc.	Variety Seed Source	Variety Name or Temporary Designation PH24E																														
Address (Street & No., or R.F.D. No., City, State, Zip Code and Country) 7301 N.W. 62nd Avenue, PO Box 85 Johnston, IA 50131-0085 USA		<div>FOR OFFICIAL USE</div> <div>PVPO Number 9600204</div>																														
Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by a '*' are considered necessary for an adequate variety description and must be completed.																																
<p>COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices: describe #25 and #26 in Comments section):</p> <table> <tr> <td>01=Light Green</td> <td>06=Pale Yellow</td> <td>11=Pink</td> <td>16=Pale Purple</td> <td>21=Buff</td> </tr> <tr> <td>02=Medium Green</td> <td>07=Yellow</td> <td>12=Light Red</td> <td>17=Purple</td> <td>22=Tan</td> </tr> <tr> <td>03=Dark Green</td> <td>08=Yellow-Orange</td> <td>13=Cherry Red</td> <td>18=Colorless</td> <td>23=Brown</td> </tr> <tr> <td>04=Very Dark Green</td> <td>09=Salmon</td> <td>14=Red</td> <td>19=White</td> <td>24=Bronze</td> </tr> <tr> <td>05=Green-Yellow</td> <td>10=Pink-Orange</td> <td>15=Red & White</td> <td>20=White Capped</td> <td>25=Variegated (Describe)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>26=Other (Describe)</td> </tr> </table>			01=Light Green	06=Pale Yellow	11=Pink	16=Pale Purple	21=Buff	02=Medium Green	07=Yellow	12=Light Red	17=Purple	22=Tan	03=Dark Green	08=Yellow-Orange	13=Cherry Red	18=Colorless	23=Brown	04=Very Dark Green	09=Salmon	14=Red	19=White	24=Bronze	05=Green-Yellow	10=Pink-Orange	15=Red & White	20=White Capped	25=Variegated (Describe)					26=Other (Describe)
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				26=Other (Describe)																												
<p>STANDARD INBRED CHOICES (Use the most similar (in background and maturity) of these to make comparisons based on grow-out trial data):</p> <table> <tr> <td> <p>Yellow Dent Families:</p> <p>Family Members</p> <p>B14 CM105, A632, B64, B68</p> <p>B37 B37, B76, H84</p> <p>B73 N192, A679, B73, NC268</p> <p>C103 Mo17, Va102, Va35, A682</p> <p>Oh43 A619, MS71, H99, Va26</p> <p>WF9 W64A, A554, A654, Pa91</p> </td> <td> <p>Yellow Dent (Unrelated):</p> <p>Co109, ND246,</p> <p>Oh7, T232</p> <p>W117, W153R</p> <p>W182BN</p> <p>White Dent:</p> <p>CI66, H105, Ky228</p> </td> <td> <p>Sweet Corn:</p> <p>C13, Iowa5125, P39, 2132</p> <p>Popcorn:</p> <p>SG1533, 4722, HP301, HP7211</p> <p>Pipcorn:</p> <p>Mo15W, Mo16W, Mo24W</p> </td> </tr> </table>			<p>Yellow Dent Families:</p> <p>Family Members</p> <p>B14 CM105, A632, B64, B68</p> <p>B37 B37, B76, H84</p> <p>B73 N192, A679, B73, NC268</p> <p>C103 Mo17, Va102, Va35, A682</p> <p>Oh43 A619, MS71, H99, Va26</p> <p>WF9 W64A, A554, A654, Pa91</p>	<p>Yellow Dent (Unrelated):</p> <p>Co109, ND246,</p> <p>Oh7, T232</p> <p>W117, W153R</p> <p>W182BN</p> <p>White Dent:</p> <p>CI66, H105, Ky228</p>	<p>Sweet Corn:</p> <p>C13, Iowa5125, P39, 2132</p> <p>Popcorn:</p> <p>SG1533, 4722, HP301, HP7211</p> <p>Pipcorn:</p> <p>Mo15W, Mo16W, Mo24W</p>																											
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COMMENTS

Color choice noted as a 26 indicates this trait was observed and recorded as green.

Data for Items 1, 3, 4, 5, 6, 7a, 7b, 8, and 9 is based primarily on a maximum of 4 reps from Johnston, Iowa, grown in 1994 and 1995, plus description information from the maintaining station.

EXHIBIT C: PH24E

1. TYPE: (describe intermediate types in Comments section):			Standard Inbred Name		
2 1=Sweet 2=Dent 3=Flint 4=Flour 5=Pop 6=Ornamental			CM105		
2. REGION WHERE DEVELOPED IN THE U.S.A.:			Standard Seed Source		
2 1=Northwest 2=Northcentral 3=Northeast 4=Southeast 5=Southcentral 6=Southwest 7=Other			AMES 19315		
3. MATURITY (In Region of Best Adaptability; show Heat Unit formula in 'Comments' section)			DAYS HEAT UNITS		
DAYS HEAT UNITS			DAYS HEAT UNITS		
067	1,354.2	From emergence to 50% of plants in silk	062	1,233.8	
066	1,343.7	From emergence to 50% of plants in pollen	062	1,230.7	
006	0,130.2	From 10% to 90% pollen shed	005	0,123.7	
		From 50% silk to optimum edible quality			
069	1,309.8	From 50% silk to harvest at 25% moisture	065	1,320.2	
4. PLANT:			Standard Sample		
			Deviation Size		
199.8	cm Plant Height (to tassel tip)	11.07 06	168.5	20.55	06
078.8	cm Ear Height (to base of top ear node)	09.68 06	060.5	07.94	06
014.6	cm Length of Top Ear Internode	01.62 06	012.8	01.87	06
0.0	Average Number of Tillers	0.02 00.41 06	0.01	00.41	06
1.2	Average Number of Ears per Stalk	00.41 06	1.0	00.00	06
4	Anthocyanin of Brace Roots: 1=Absent 2=Faint 3=Moderate 4=Dark		4		
5. LEAF:			Standard Sample		
			Deviation Size		
09.1	cm Width of Ear Node Leaf	00.21 06	07.1	01.18	06
79.1	cm Length of Ear Node Leaf	04.55 06	70.8	05.46	06
05	Number of leaves above top ear	00.42 06	05	00.53	06
40	Degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf)	07.82 06	48	07.03	06
03	Leaf Color (Munsell code) 5GY3.4		03	5GY4.4	
1	Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)		3		
7	Marginal Waves (Rate on scale from 1=none to 9=many)		5		
6	Longitudinal Creases (Rate on scale from 1=none to 9=many)		6		
6. TASSEL:			Standard Sample		
			Deviation Size		
07	Number of Primary Lateral Branches	00.96 06	04	01.02	06
67	Branch Angle from Central Spike	32.92 06	32	08.43	06
53.4	cm Tassel Length (from top leaf collar to tassel tip)	02.98 04	46.4	04.14	04
6	Pollen Shed (rate on scale from 0=male sterile to 9=heavy shed)		7		
07	Anther Color (Munsell code) 10Y8.5		07	5Y9.4	
01	Glume Color (Munsell code) 7.5GY5.5		01	5GY6.5	
1	Bar Glumes (Glume Bands): 1=Absent 2=Present		1		
Application Variety Data			Standard Inbred Data		
Page 1					

7a. EAR (Unhusked Data):

- 14 Silk Color (3 days after emergence) (Munsell code) 10RP4~~5~~
 01 Fresh Husk Color (25 days after 50% silking) (Munsell code) 5GY7~~3~~
 21 Dry Husk Color (65 days after 50% silking) (Munsell code) 2.5Y8~~4~~
 1 Position of Ear at Dry Husk Stage: 1= Upright 2= Horizontal 3= Pendant
 6 Husk Tightness (Rate of Scale from 1=very loose to 9=very tight) 5
 2 Husk Extension (at harvest): 1=Short (ears exposed) 2=Medium (<8 cm) 2
 3=Long (8-10 cm beyond ear tip) 4=Very Long (>10 cm)

07 2.5GY9~~6~~
 02 5GY6~~5~~
 21 2.5Y8.5~~4~~

2

525
7

7b. EAR (Husked Ear Data):

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
16.5 cm Ear Length	00.60	06	14.2 01.40	06
41.6 mm Ear Diameter at mid-point	02.23	06	39.0 01.10	06
125.4 gm Ear Weight	16.61	06	81.0 25.87	06
14 Number of Kernel Rows	00.90	06	14.1 00.65	06
2 Kernel Rows: 1=Indistinct 2=Distinct			2	
1 Row Alignment: 1=Straight 2=Slightly Curved 3=Spiral			1	
10.3 cm Shank Length	01.84	06	11.5 02.13	06
2 Ear Taper: 1=Slight 2= Average 3=Extreme			2	

8. KERNEL (Dried)

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
14.0 mm Kernel Length	06.92	06	09.5 00.45	06
08.8 mm Kernel Width	00.41	06	07.8 00.75	06
04.5 mm Kernel Thickness	00.47	06	04.1 00.24	06
34.0 % Round Kernels (Shape Grade)	03.51	06	17.2 13.37	06
1 Aleurone Color Pattern: 1-Homozygous 2=Segregating			1	
07 Aleurone Color (Munsell code)	2.5Y8 1 2		07 2.5Y8 1 4	
07 Hard Endosperm Color (Munsell code)	2.5Y8 1 2		07 2.5Y8 1 4	
03 Endosperm Type:			3	
1=Sweet (Su1) 2=Extra Sweet (sh2) 3=Normal Starch				
4=High Amylose Starch 5=Waxy Starch 6=High Protein				
7=High Lysine 8=Super Sweet (se) 9=High Oil				
10=Other_____				
31.8 gm Weight per 100 Kernels (unsized sample)	02.71	06	21.50 04.93	06

9. COB:

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
23.7 mm Cob Diameter at mid-point	01.69	06	26.1 00.79	06
14 Cob Color (Munsell code)	2.5YR5 6		14 10R4 6	

10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); leave blank if not tested; leave Race or Strain Options blank if polygenic):

A. Leaf Blights, Wilts, and Local Infection Diseases

	Anthrachnose Leaf Blight (<i>Colletotrichum graminicola</i>)	
	Common Rust (<i>Puccinia sorghi</i>)	
	Common Smut (<i>Ustilago maydis</i>)	
	Eyespot (<i>Kabatiella zeae</i>)	
	Goss's Wilt (<i>Clavibacter michiganense</i> spp. <i>nebraskense</i>)	
5	Gray Leaf Spot (<i>Cercospora zeae-maydis</i>)	3
	Helminthosporium Leaf Spot (<i>Bipolaris zeicola</i>) Race _____	
8	Northern Leaf Blight (<i>Exserohilum turcicum</i>) Race _____	5
	Southern Leaf Blight (<i>Bipolaris maydis</i>) Race _____	
	Southern Rust (<i>Puccinia polysora</i>)	
3	Stewart's Wilt (<i>Erwinia stewartii</i>)	1
	Other (Specify) _____	

B. Systemic Diseases

Corn Lethal Necrosis (MCMV and MDMV)
 Head Smut (*Sphacelotheca reiliana*)
 Maize Chlorotic Dwarf Virus (MDV)
 Maize Chlorotic Mottle Virus (MCMV)
 Maize Dwarf Mosaic Virus (MDMV)
 Sorghum Downy Mildew of Corn (*Peronosclerospora sorghi*)
 Other (Specify) _____

C. Stalk Rots

Anthrachnose Stalk Rot (*Colletotrichum graminicola*)
 Diplodia Stalk Rot (*Stenocarpella maydis*)
 Fusarium Stalk Rot (*Fusarium moniliforme*)
 Gibberella Stalk Rot (*Gibberella zeae*)
 Other (Specify) _____

D. Ear and Kernel Rots

Aspergillus Ear and Kernel Rot (*Aspergillus flavus*)
 Diplodia Ear Rot (*Stenocarpella maydis*)
 Fusarium Ear and Kernel Rot (*Fusarium moniliforme*)
 Gibberella Ear Rot (*Gibberella zeae*)
 Other (Specify) _____

11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); (leave blank if not tested) :

	Banks grass Mite (<i>Oligonychus pratensis</i>)	
	Corn Worm (<i>Helicoverpa zea</i>)	
	Leaf Feeding	
	Silk Feeding	
	mg larval wt.	
	Ear Damage	
	Corn Leaf Aphid (<i>Rhopalosiphum maidis</i>)	
	Corn Sap Beetle (<i>Carpophilus dimidiatus</i>)	
	European Corn Borer (<i>Ostrinia nubilalis</i>)	
6	1st Generation (Typically Whorl Leaf Feeding)	5
0	2nd Generation (Typically Leaf Sheath-Collar Feeding)	0
	Stalk Tunneling	
0	cm tunneled/plant	0
	Fall Armyworm (<i>Spodoptera frugiperda</i>)	
	Leaf Feeding	
	Silk Feeding	
	mg larval wt.	
	Maize Weevil (<i>Sitophilus zeamaze</i>)	
	Northern Rootworm (<i>Diabrotica barberi</i>)	
	Southern Rootworm (<i>Diabrotica undecimpunctata</i>)	
	Southwestern Corn Borer (<i>Diatraea grandiosella</i>)	
	Leaf Feeding	
	Stalk Tunneling	
	cm tunneled/plant	
	Two-spotted Spider Mite (<i>Tetranychus urticae</i>)	
	Western Rootworm (<i>Diabrotica virgifera virgifera</i>)	
	Other (Specify) _____	
12. AGRONOMIC TRAITS:-		
5	Staygreen (at 65 days after anthesis) (Rate on a scale from 1=worst to excellent)	2
1.0	% Dropped Ears (at 65 days after anthesis)	0.0
	% Pre-anthesis Brittle Snapping	
	% Pre-anthesis Root Lodging	
3.4	Post-anthesis Root Lodging (at 65 days after anthesis)	12.5
3,778.6	Kg/ha Yield of Inbred Per Se (at 12-13% grain moisture)	2,184.3

13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied):

1 Isozymes

1 RFLP's

0 RAPD's

COMMENTS (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D):

EXHIBIT D. ADDITIONAL DESCRIPTION OF PH24E
INBRED PER SE YIELD TEST COMPARISON OF PH24E AND PHJ90 EVALUATED OVER YEARS

VARIETY #1 = PH24E
VARIETY #2 = PHJ90

		* = 10% SIG + = 5% SIG # = 1% SIG																			
YEAR REGION VAR #	BU	ACR	BU	MST	TST	QGU	QGU	SDG	EST	GDU	GDU	RT	STA	STK	BRT	GRN	BAR	DRP			
	ABS	%MN	ABS	ABS	ABS	HA	HA	VGR	CNT	SHD	SILK	LDG	GRN	LDG	STK	ABS	PLT	EAR			
93	SUM	1	77.7	158	18.2	56.2	48.7	158	3.6	42.5	1381	1405	90.3	5.8	99.0	95.6	8.0	96.9	98.6		
	2	51.6	103	15.9	55.4	32.4	32.4	103	5.5	41.0	1343	1369	98.6	2.0	83.7	91.6	5.5	93.9	100.0		
	LOCS	8	8	11	5	8	8	8	7	13	15	15	4	7	3	8	1	14	1		
	REPS	16	16	19	10	16	16	16	11	20	16	16	7	12	6	11	2	18	2		
	DIFF	26.1	55	2.3	0.8	16.3	16.3	55	1.9	1.5	38	36	8.3	3.8	15.3	4.0	2.5	3.0	1.4		
	PR > T	.001#	.002#	.006#	.127	.001#	.001#	.002#	.003#	.458	.000#	.000#	.391	.000#	.356	.256		.044+			
94	SUM	1	102.1	125	19.9	56.4	64.1	125	3.5	30.6	1395	1432	96.2	5.1	98.4	97.8	4.5	97.0	100.0		
	2	90.2	113	18.2	56.8	56.6	56.6	113	4.9	33.3	1356	1397	98.3	2.4	92.5	94.6	3.5	98.0	100.0		
	LOCS	12	12	13	8	12	12	12	21	45	38	37	4	12	7	7	1	13	2		
	REPS	21	21	23	15	21	21	21	28	70	40	39	5	19	13	9	2	16	4		
	DIFF	11.9	12	1.7	0.4	7.5	7.5	12	1.4	2.7	39	35	2.1	2.7	5.9	3.2	1.0	1.0	0.0		
	PR > T	.018+	.059*	.003#	.170	.018+	.018+	.059*	.000#	.011+	.000#	.000#	.272	.000#	.050*	.195		.158	.999		
95	SUM	1	72.7	99	16.1	57.3	45.6	99	3.9	35.3	1373	1418	95.6	3.7	88.2	97.5	7.5	99.4	99.6		
	2	71.4	93	16.6	56.7	44.8	44.8	93	5.2	34.2	1327	1357	98.0	2.4	92.9	96.0	7.7	99.1	100.0		
	LOCS	11	11	11	3	11	11	11	18	27	40	40	6	9	9	5	3	13	6		
	REPS	16	16	17	5	16	16	16	21	32	45	45	10	11	17	8	5	13	12		
	DIFF	1.3	6	0.5	0.6	0.8	0.8	6	1.3	1.1	46	61	2.4	1.3	4.7	1.5	0.2	0.3	0.4		
	PR > T	.852	.628	.505	.502	.852	.852	.628	.002#	.515	.000#	.000#	.248	.111	.091*	.627	.840	.812	.175		
96	SUM	1	78.4	122	23.8	53.4	49.2	122	3.4	32.8	1400	1427	98.8	5.7	93.1	92.0	7.8	96.9	99.6		
	2	66.3	103	21.6	52.5	41.6	41.6	103	4.6	33.8	1353	1397	98.7	2.8	92.7	93.5	7.5	99.1	99.4		
	LOCS	16	16	18	11	16	16	16	22	35	42	42	7	6	11	3	4	13	6		
	REPS	23	23	25	16	23	23	23	26	40	43	43	9	6	16	4	4	14	9		
	DIFF	12.1	19	2.2	0.9	7.6	7.6	19	1.2	1.0	47	30	0.1	2.9	0.4	1.5	0.3	2.2	0.2		
	PR > T	.001#	.003#	.001#	.063*	.001#	.001#	.003#	.000#	.421	.000#	.000#	.822	.005#	.852	.746	.809	.167	.842		
TOTAL	SUM	1	83.0	124	20.1	55.2	52.1	124	3.6	33.6	1389	1423	95.8	5.0	93.4	96.2	7.3	97.6	99.6		
	2	71.1	103	18.6	54.8	44.6	44.6	103	5.0	34.5	1345	1382	98.4	2.4	91.8	93.7	6.9	97.5	99.8		
	LOCS	47	47	53	27	47	47	47	68	120	135	134	21	34	30	23	9	53	15		
	REPS	76	76	84	46	76	76	76	86	162	144	143	31	48	52	32	13	61	27		
	DIFF	11.9	20	1.5	0.4	7.5	7.5	20	1.4	0.9	44	42	2.6	2.6	1.6	2.5	0.4	0.1	0.2		
	PR > T	.000#	.000#	.000#	.083*	.000#	.000#	.000#	.000#	.195	.000#	.000#	.129	.000#	.404	.109	.420	.904	.604		

*PR > T values are valid only for comparisons with LOCS >= 10.

CLARIFICATION OF DATA IN EXHIBITS C AND D

Please note the data presented in Exhibit C, "Objective Description of Variety," is data collected primarily at Johnston, Iowa plus description information from the maintaining station. The data in Exhibit D, "Additional Description of Variety," is data from comparisons of inbreds grown in the same tests in the adapted growing area of PH24E.

There are environmental factors that differ from year to year that might explain discrepancies in the original exhibit C compared to the amended exhibit C. In 1994 there were warmer May temperatures and there was a cool, wet, August. In 1995, May was wet and August was warmer. In 1996, May was very wet and August was cool with very little heat or drought stress compared to most years. Environmental temperature and precipitation differences during the vegetative and grain fill periods can impact plant and grain traits and be a source of variability. Please see table 3 which summarizes rainfall and growing season temperatures from 1994-1997.

The original exhibit C had 2 years of data included (1994 and 1995). The amended exhibit C had 3 years included (1994, 1995, 1996). In addition, in an effort to continue to aggressively pursue PVP protection for this variety, we included PH24E in our experiments again in 1997.

Table 3. Average temperatures (Fahrenheit) and rainfall (inches) for central Iowa.

TEMPERATURE

YEAR	MAY	JUN	JULY	AUG	AVERAGE
1994	59.8	70.7	71.9	69.0	67.9
1995	56.2	69.4	74.3	76.9	69.2
1996	56.2	69.3	71.3	70.5	66.8
1997	53.5	70.6	74.1	69.6	67.0
AVG	56.4	70.0	72.9	71.5	67.7

RAINFALL

YEAR	MAY	JUN	JULY	AUG	Total
1994	3.67	5.75	1.71	4.18	15.31
1995	5.04	4.19	2.94	2.87	15.04
1996	8.47	4.35	2.51	2.14	17.47
1997	4.32	3.27	4.10	1.36	13.05
AVG	5.38	4.39	2.82	2.64	15.22

DEFINITIONS

In the description and examples, a number of terms are used herein. In order to provide a clear and consistent understanding of the specification and claims, including the scope to be given such terms, the following definitions are provided:

BAR PLT = BARREN PLANTS. This is the percent of plants per plot that were not barren (lack ears).

BRT STK = BRITTLE STALKS. This is a measure of the stalk breakage near the time of pollination, and is an indication of whether a hybrid or inbred would snap or break near the time of flowering under severe winds. Data are presented as percentage of plants that did not snap.

BU ACR = YIELD (BUSHEL/ACRE). Actual yield of the grain at harvest adjusted to 15.5% moisture. ABS is in absolute terms and % MN is percent of the mean for the experiments in which the hybrid or inbred was grown.

DRP EAR = DROPPED EARS. This is a measure of the number of dropped ears per plot and represents the percentage of plants that did not drop ears prior to harvest.

EAR HT = EAR HEIGHT. The ear height is a measure from the ground to the top developed ear node attachment and is measured in centimeters.

EST CNT = EARLY STAND COUNT. This is a measure of the stand establishment in the spring and represents the number of plants that emerge on a per plot basis for the hybrid or inbred.

GDU SHD = GDU TO SHED. The number of growing degree units (GDUs) or heat units required for an inbred line or hybrid to have approximately 50 percent of the plants shedding pollen and is measured from the time of planting. Growing degree units are calculated by the Barger Method, where the heat units for a 24-hour period are:

$$\text{GDU} = \frac{(\text{Max. temp.} + \text{Min. temp.})}{2} - 50$$

The highest maximum temperature used is 86°F and the lowest minimum temperature used is 50°F. For each inbred or hybrid it takes a certain number of GDUs to reach various stages of plant development.

GDU SLK = GDU TO SILK. The number of growing degree units required for an inbred line or hybrid to have approximately 50 percent of the plants with silk emergence from time of planting. Growing degree units are calculated by the Barger Method as given in GDU SHD definition.

GRN APP = GRAIN APPEARANCE. This is a 1 to 9 rating for the general quality of the shelled grain as it is harvested based on such factors as the color of the harvested grain, any mold on the grain, and any cracked grain. High scores indicate good grain quality and low scores indicate poor grain quality.

MST = HARVEST MOISTURE. The moisture is the actual percentage moisture of the grain at harvest.

PLT HT = PLANT HEIGHT. This is a measure of the height of the plant from the ground to the tip of the tassel in centimeters.

RT LDG = ROOT LODGING. Root lodging is the percentage of plants that do not root lodge; plants that lean from the vertical axis at an approximately 30° angle or greater would be counted as rootlodged.

SDG VGR = SEEDLING VIGOR. This is the visual rating (1 to 9) of the amount of vegetative growth after emergence at the seedling stage (approximately five leaves). A higher score indicates better vigor and a low score indicates poorer vigor.

STA GRN = STAYGREEN. Staygreen is the measure of plant health near the time of black layer formation (physiological maturity). A high score indicates better late-season plant health.

STK LDG = STALK LODGING. This is the percentage of plants that did not stalk lodge (stalk breakage) as measured by either natural lodging or pushing the stalks and determining the percentage of plants that break below the ear.

TST WT = TEST WEIGHT UNADJUSTED. The measure of weight of the grain in pounds for a given volume (bushel).

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

PLEASE NOTE:

STD-470-E (03-96)

14E. EXHIBIT E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of PH24E. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of PH24E.